Government Support for Software Design and Productivity Research

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and

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PITAC Charter

- **The Committee shall provide an independent assessment of:**
  - Progress made in implementing the High-Performance Computing and Communications (HPCC) Program;
  - Progress in designing and implementing the Next Generation Internet initiative;
  - ●●●
  - Other issues as specified by the Director of the Office of Science and Technology.
    - **Review of the entire IT investment strategy — is it meeting the nation's needs?**

PITAC History: Phase I

- **Feb. 27-28, 1997: First committee meeting**
  - Two year term; 25 members from academia and industry
- **Aug. 6, 1998: Interim report is released**
- **Jan. 1999: FY2000 budget initiative announced - Information Technology for the Twenty-first Century (IT^2)**
- **February 1999: Committee report is released**

Information Technology Research: Investing in Our Future

- **February 1999: Committee Term extended to 2001**

PITAC History: Phase I I

- **Reports elaborating IT research to transform society**
- **Reports on Digital Divide (Feb. 2000), Access to Government (Sept. 2000), Open Source Software for High End Computing (Oct. 2000), Digital Libraries (Feb. 2001), Health Care (Feb. 2001), Learning (Feb. 2001)**
- **National Security report and Individual Security report to appear**
- **Committee is updating the 1999 report**
- **Committee was extended through June 2003**
  - Memberships expired Dec. 1, 2001

What did the report say?

What has been the government's response?

What are the next steps?

Principal Finding

- **Drift Away from Long-Term Fundamental Research**
  - Agencies pressed by the growth of IT needs
  - Most IT R&D agencies are mission-oriented
- **This Trend Must Be Reversed**
  - Continue the flow of ideas to fuel the information economy and society

Remedy

- **Double the Federal IT R&D Investment to 2.6 billion dollars per year**
  - Ramp up over five years
  - Focus on increasing fundamental research
- **Invest in Key Areas Needing Attention**
  - **Software**
  - Scalable Information Infrastructure
  - High-End Computing
  - Social, Economic, and Workforce Issues
- **Develop a Coherent Management Strategy**
  - Establish clear organizational responsibilities
  - Diversify modes of support

Interagency Collaboration and Planning

- **IWG's – Interagency Working Groups**
  - Representatives from the different agencies
  - Primary role is coordination and information exchange
- **PCA's - Program Component Areas**
  - Organizational structure for programs

Make software research a substantive component of every major information technology research initiative.

- **Software Design and Productivity (SDP) PCA**
  - Coordinate research leading to more productive software development methods and higher-quality software with predictable characteristics that is cost effective
- **High Confidence Systems (HCS) PCA renamed as High Confidence Software and Systems (HCSS) PCA**
  - Expansion of coverage to include information assurance and safety in addition to security
- **Human Centered Systems (HuCS) PCA restructured as Human Computer Interaction and Information Management (HCI&IM) PCA with an expanded research agenda**

Software efforts in other PITAC Report areas

- **High End Computing (HECC) PCA**
- **Large-scale Networking (LSN) PCA**
- **Potential cross-agency efforts to address software problems that span PCAs**

Budget recommendation: Increase funding for software research

- **NSF, with increased funding for software research, implemented the Information Technology Research (ITR) initiative in FY2000**
  - Larger individual grants
  - Support for more researchers
  - Support for thematic programs e.g. CISE Quantum and Biologically Inspired Computing (QuBIC)
- **Second round in FY2001**
- **Third round for FY2002 in progress**

We need to sustain this progress!

What needs to happen?

Making the Case for Software Research

- We need to do a better job explaining software research to non-IT people
  - **Differentiate software design from producing artifacts**
- We must continue to explain why software research needs are not satisfied by commercial activity
- Software research done by mission agencies must be presented in agency mission terms
  - **E.g. Agent-based systems *for coordination of autonomous vehicles***
  - **E.g. Embedded software design tools *for avionics, medical devices, and weapons***

Creating a Balanced Research Portfolio

Excellent response to 1999 PITAC Report

- **Budget increases, interagency cooperation, ITR program**

But …

- Need distribution in risk as well as size and duration
  - **Panels and peer review favor incremental progress**
  - **Researchers don't pose long-term hard important questions (long-term grand-challenge proposals get poor reviews)**
- Funding still too low
  - **Excellent proposals unfunded**
  - **Low success rates despite large cuts in proposal budgets**
  - **Encourages conservative proposals**
- Community concerns about review process

What You Can Do to Help

- **Articulate the problem in terms the public can understand**
- **Articulate the research agenda for each of the stakeholders**
- **Communicate with Congress**
  - Get to know your public affairs staff
  - Get to know your state's congressional staffers
- **Present a positive and united front**
  - Be supportive of other people's research
  - Don't criticize in public

Last Slide